A(3, 5) B(4, -2) C(-1, -6) D(-2, 1)

point matrix $\begin{bmatrix}3\\5\end{bmatrix}$ $\begin{bmatrix}x\\y\end{bmatrix}$

polygon matrix

$\begin{bmatrix}3 & 4 & -1 & -2\\5 & -2 & -6 & 1\end{bmatrix}$

9.2 Matrices

Matrix-a rectangular arrangement of numbers in rows and columns

$\begin{pmatrix}5 & 2 & 0\\-8 & 7 & 2.4\\13 & -11 & 0\\4 & 19 & 0.8\end{pmatrix}$

Rows 4

Columns 3

Row x Column 4x3

Find the image of ABCD using the translation of 2 units left and 4 units down.

$\begin{bmatrix}-2\\-4\end{bmatrix}$

translation matrix

$\begin{bmatrix}-2 & -2 & -2 & -2\\-4 & -4 & -4 & -4\end{bmatrix}$

$\begin{bmatrix}3 & 4 & -1 & -2\\5 & -2 & -6 & 1\end{bmatrix} + \begin{bmatrix}-2 & -2 & -2 & -2\\-4 & -4 & -4 & -4\end{bmatrix}$

Image Matrix $\begin{bmatrix}1 & 2 & -3 & -4\\1 & -6 & -10 & -3\end{bmatrix}$

Matrix Operations

Adding/Subtracting Matrices--must be same dimensions

Multiplying Matrices--A x B; columns of A must = rows of B

$A_{3\times 2} \times B_{2\times 4} = AB_{3\times 4}$

ex: $\begin{pmatrix}3 & -5\\1 & 4\end{pmatrix} \cdot \begin{pmatrix}2 & -1\\0 & 6\end{pmatrix} = \begin{bmatrix}1,1 & 1,2\\2,1 & 2,2\end{bmatrix}$

2x2 2x2 2x2

$\begin{matrix}3(2)+-5(0) & 3(-1)+5(6)\\1(2)+4(0) & 1(-1)+4(6)\end{matrix}$ $\begin{bmatrix}6 & -33\\2 & 23\end{bmatrix}$

9.3 Perform Reflections

We already discussed reflecting in the x and y axis.
What happens to the coordinates when you reflect in ....

x-axis? $(a,b) \rightarrow (a,-b)$

y-axis? $(a,b) \rightarrow (-a,b)$

Let's reflect in the line y=x.

A(-5,6) A'(6,-5)

gsp y+x switch

line y = -x

A'(-6,+5)

Conclusions about Reflections

If (a, b) is reflected in x-axis, its image is (a,-b)

If (a, b) is reflected in y-axis, its image is (-a,b)

If (a, b) is reflected in y=x, its image is (b,a)

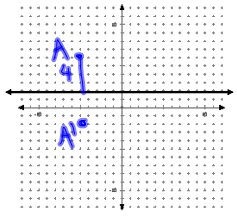
If (a, b) is reflected in y=-x, its image is (-b,-a)

Reflect a point in a vertical or horizontal line.

A(-5, 6)

Reflect in the line y = 2

A'(-5,-2)

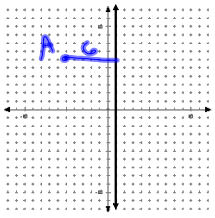


Reflect a point in a vertical or horizontal line.

A(-5, 6)

Reflect in the line x = 1

A'(7,6)



Using Matrices to reflect.

Reflection in the x-axis

$$\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$

Reflection in the y-axis

$$\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$$

Use matrix multiplication to find the image.

Reflect ΔPQR in the x-axis.

P(-3, 6) Q(-5,3) R(-1,2)

$$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \times \begin{bmatrix} -3 & -5 & -1 \\ 6 & 3 & 2 \end{bmatrix}$$

2x2 2x3

Image Matrix $\begin{bmatrix} -3 & -5 & -1 \\ -6 & -3 & -2 \end{bmatrix}$

HW
p584 #s 3, 8, 13, 14, 20
p593 #s 3, 5, 9, 11, 13

Attachments

9_3notes_examples.gsp